



المؤتمر العلمي الدولي الثالث للهندسة و العلوم

The 3RD Scientific International Conference in Engineering & Science

<http://bwu.edu.ly/icse2024>

Received 25/07/2024

Revised 22/08/2024

Published 10/09/2024

icse@bwu.edu.ly

Evaluation of Practices and Attitudes among Dental Technicians toward Infection Control Measures within the Prosthodontics Laboratory in the Libyan Cities of Misurata, Bani Waleed and Zliten.

Waed Alfaytouri Almaqroush,

Dental technician, Bani Waleed, Libya.

Corresponding E-mail: wa3d.alfaytouri42@gmail.com

Abstract: Dental technicians may be exposed to the transmission of infection inside the prosthodontics laboratory, even if they are not in direct contact with the patient's mouth, through impressions, restorations, and dental devices coming from the clinic. Aim: to investigate of practices and attitudes of dental technicians regarding infection control procedures within prosthodontic laboratories (public and private) in Misurata, Bani Waleed and Zliten. A cross-sectional descriptive study was conducted by distributing questionnaires among laboratory technicians. The data were analyzed and summarized statistically using SPSS version (26.0). Results: (57.4%) of technicians were aware of the various infection control measures. About (58.8%) wear work coat, (45.6%) use gloves, (26.5%) use mouth masks, only (4.4%) wear eye shields. (23.5%) of technicians received vaccination against hepatitis B virus. (72.1%) use spraying for the disinfection of impressions. (41.2%) of them transferred the impressions using napkin. (85.3%) of participants wear gloves when receiving the dental impression and (79.4%) of them change gloves after each case. (91.2%) of technicians sterilize and disinfect impressions and prosthodontic coming from dental clinic. (32.4%) of technicians disinfect the restorations prior sending it to clinic. (50%) of the laboratory is sterilized on a daily routine after the end of work. (41.2%) of them disinfecting the used pumice it periodically. Conclusion: Dental technicians had varying levels of practices and attitudes toward infection control procedures. It is necessary to improve the level of knowledge of technicians about the various infection control measures that must be taken in place in the laboratory.

Keywords: Dental technicians, Prosthodontic laboratory, infection control in dental laboratory, Dental infection, and infection control measures.

1. INTRODUCTION:

In recent years, cross infection and contamination issues in dental laboratories and clinics have become a significant concern due to the potential risk of professionals and patients getting infected [1,2]. Infections are caused by pathogens, including bacteria, viruses and prions. Pathogenic bacteria can cause many serious diseases, including pneumonia, cholera and tuberculosis. In the dentistry field, the viruses of great concern in infection control are blood-borne diseases such as hepatitis B & C and HIV. Different studies have shown that HBV (Hepatitis B virus) is statistically present in 1

out of 140 dental laboratory cases. Other viruses also have the potential to become threats to human health [3]. Apart from bacteria and viruses, prions are less understanding pathogens because of its recent discovery, it also affects nerves and brain tissue that are fatal and gives increased urgency to ensure adequate infection control measures. There is no diagnostic test for the presence of infection in prion diseases [4].

Dental technicians are one of the occupations that are at risk of contracting an infectious disease that can occur from transmission through saliva, blood, or contaminated equipment [5]. Dental impressions, jaw

registration bases, plaster models and other prosthetic appliances received from dental clinics if not properly disinfected prior handling can lead to cross-contamination and cross infection to dental technicians and laboratory personnel. Dental impressions received from dental clinic are always hold in saliva and occasionally blood. Numerous pathogenic and non-pathogenic bacteria, including HIV, herpes simplex, *Streptococcus aureus*, *Candida albicans*, and viral hepatitis can be found in these saliva and blood samples [6]. According to numerous studies conducted in recent years, more than half of the dental prostheses that arrived from dental laboratories were infected with bacteria from the mouth of patient [7]. The most common sources of contamination in dentistry laboratories are the lathes and pumice used for prosthesis finishing [8]. Many studies have also indicated that pumice being greatly contaminated with bacteria, including *pseudomonas*, *micrococcus*, gram-negative bacilli of *Acinetobacter alcaligenes*. [9]. As these organisms are alien to a human oral cavity, they can prove to be fatal for the health of the patients whose dentures are infected with these microorganisms and the staff who handle the infected equipment [9, 10].

Dental technicians can get infected in area called "prosthodontic laboratories" especially when conditions are unsterilized. Disinfect the mold is difficult due microorganisms can enter the inside part of the cast and this make disinfection less optimal. Oral bacteria can survive for 7 days even within gypsum. So, the dental clinic must be disinfected all dental impression before sent to dental laboratory. In the dental laboratory can be insecure technicians to infection out of direct contact with items that have not been disinfected through abrasions and cuts when working without wear gloves and masks. Also, dental

impression can be transferred Infection in dental laboratory through surface contact aerosols hand pieces, pumice, burs, etc. [2]. Prosthodontic laboratories should be as secure as feasible for any type of infection. The possibility for disease transmission can be reduced during: Immunization; particularly hepatitis B and the proper application of occupational safety procedures in the laboratory, protective equipment must be worn repeatedly with each case, especially personal ones, such as masks, gloves, and eye masks daily when there is a possibility of infection or exposure to pathogenic factors, and when disinfecting and sterilizing impressions, equipment, and various surfaces, and they must be changed after each case or Immediately after dealing with contaminated cases, a medical coat and clinic jacket should also be used, and it is recommended to change the medical coat daily [11].

Dental technicians have an equal responsibility in dental laboratory to assume appropriate infection control measures as is for dentists in a dental practice, and application of infection control protocols and the measures, also effective communication among the dental technicians and dentists, can help in creating a safe and healthy environment for workers exposed to potential diseases and occupational risks [1].

Similar studies have been conducted: According to Alfakeeh N, *et al.* 2022, The Study on Infection by impression in dental prosthetics manufacturing laboratories in Misrata. To know the most important methods they follow to prevent the transmission of infection inside laboratories, especially when dealing with dental impressions, such as sterilization and applying occupational safety conditions. A questionnaire was distributed to a sample that included 50 technicians working in

governmental and private dental prosthetics manufacturing laboratories in the city of Misrata. They were randomly selected, and their years of experience ranged between (2 - 15 years). They also concluded that there is a possibility of transmission of infection through dental impressions in dental prosthetics manufacturing laboratories, especially if sterilization rules are neglected when dealing with them. There is good awareness among technicians about the necessity of sterilizing impressions. There is a good application of occupational safety conditions and sterilization rules within laboratories, and there are no differences between the public and private sectors in the application of sterilization rules and occupational safety conditions within laboratories.

Elnaili. S, *et al.* 2022, who studied Infection Control Practice: A cross-sectional Survey on Dental Laboratory Technicians in Benghazi, Libya. To evaluate the knowledge, attitude, and practice of dental lab technicians toward infection control protocols at the dental laboratories of Benghazi, Libya. A descriptive cross-sectional study was conducted among prosthodontic dental technicians in the city of Benghazi, Libya. A self-administered questionnaire was distributed as a hard copy to the dental lab technicians working at both governmental and private dental laboratories (3 governmental and 7 private dental laboratories). Within the limitations of the present study, the respondents demonstrated varying levels of knowledge, attitude and infection control practices. More efforts are needed to improve infection control practices and to apply appropriate policies in order to ensure the safety of the technicians and patients.

Balcos. C, *et al.* 2018, who studied Evaluation of Infection Control Knowledge and Attitudes among Dental Technicians in Iasi. The goal of

this study was to evaluate the knowledge and attitudes of dental technicians towards the methods used to prevent infection transmission in the dental laboratories in Iasi. A questionnaire-based study was initiated involving 68 technicians aged between 24 and 49 years. The 14 questions were related to infection control attitudes and implemented specific measures. The awareness and knowledge of dental technicians must be increased by educational interventions in order to prevent infection transmission and to increase the level of safety during oral health care.

This study was to evaluate the practices and attitudes of dental technicians regarding infection control procedures within dental laboratories of the Libyan cities: Misrata, Bani Waleed and Zlitan.

These hypotheses were studied in the study population through the results of previous studies:

- There is no complete commitment to wearing a work coat and protective equipment in the dental laboratory.
- Dental technicians' lack of interest in vaccination against hepatitis B virus.
- There is no transmission of infection through dental impressions, by applying the necessary procedures when receiving the impression from the clinic until it is sent.
- There is no proper application of sterilization procedures within the dental laboratory.

2. Material and Methods:

2.1. Study design: A cross-sectional descriptive study was conducted by distributing questionnaires among laboratory technicians within the prosthetics laboratory.

2.2. Study population: This study included 68 dental technicians in studied cities, the response rate was (97.1%). The number of males was 25 (36.8%) and females were 43 (63.2%). Their ages ranged between (21 - 54 years) and their years of experience ranged from (<1 year - > 10 years), of whom (51%) were they work in the Governmental sector, and (49%) work in the private sector. Distributors to 14 dental laboratories (private and public) in the cities of Misurata, Bani Walid, and Zliten (Table 1).

Item	Group	No. (%)
Gender	Male	25 (37 %)
	Female	43 (63 %)
Work institution	Governmental	35 (51 %)
	Private	33 (49 %)
Years of work experience	<1 year	25 (36.8%)
	1- 5 years	29 (42.6%)
	6- 10 years	8 (11.8%)
	> 10 years	6 (8.8%)
Total		68 (100%)

2.3. Sampling technique: A random group of dental laboratories in the city of Misrata, Bani Waleed, and Zliten was selected divided as follows: 10 laboratories in the city of Misrata (8 private and 2 Governmental), the city of Bani Waleed (2 private laboratories), and the city of Zliten (2 private laboratories), and a questionnaire form was given to dental technicians wishing to join the study sample to fill out.

2.4. Study duration: Data was collected over a period of two months, from April 2024 to May 2024

2.5. Details of the Questionnaire: The questionnaire consists of two sections: The first section contains demographic details such as (Gender, Age, City, Work institution, Years of work or experience). The second section

contains 16 closed questions: to evaluate a technician’s knowledge, attitudes, and practice of infection control procedures and measures among technicians in the dental laboratory: the technician’s knowledge of the various infection control measures that must be taken, wearing a lab coat, using gloves, protective glasses, a face shield, and vaccination against the infection (hepatitis B virus), receiving the impression in the dental laboratory, disinfecting the work when sending it to or receiving it from dental clinics, type and method of disinfection, sterilizing the instruments and disinfecting the pumice. Finally, the technicians were asked whether infection control measures and procedures impose a financial burden.

The questionnaire was distributed randomly to dental technicians in 14 laboratories (public and private) in the following Libyan cities (Misrata, Bani Waleed, Zliten).

2.6. Statistical analysis: The data were conducted and summarized statically using the SPSS program (SPSS version 26.0). The Chi-square test utilized the association among variables at a (0.05) level of significance.

3. Results and Discussion:

Through statistical analysis of the data collected from the questionnaires, the following results were reached: The results showed that 29 (42.6%) of dental technicians are not fully aware of the various infection control measures that must be taken in the workplace (Figure 1).

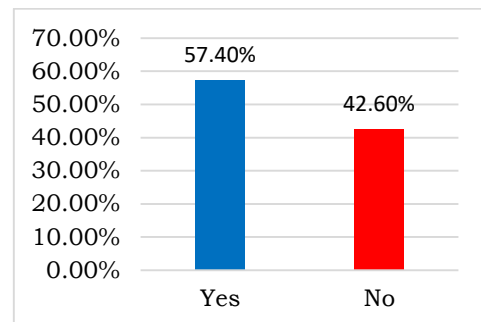


Figure 1: Percentage of knowledge of various infection control procedures.

Compared to a study conducted in North India on infection control in dental laboratory, (25%) of participants were not completely aware of infection control procedures, the percentage in this study being the highest [12]. Another study in the city of Riyadh showed that (85.5%) of the participants were not fully aware and did not follow preventive measures to combat infection, which is the highest percentage [13]. Dental laboratory owners must bear the legal and ethical responsibility to train new technicians on infection control procedures that must be followed within the laboratory, whether in routine or high-risk situations.

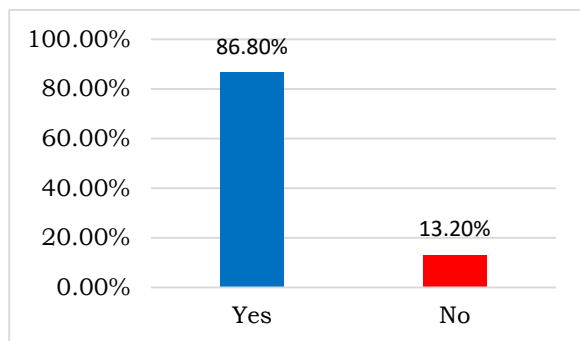


Figure 2: Percentage consideration the risk of transmission of infection in the prosthodontics laboratory.

As for taking into consideration the risk of transmission of infection in the prosthodontics laboratory, the majority of dental technicians, 59 (86.8%), responded that they take into consideration the risk of transmission of infection. In comparison with a study conducted in Iasi, the percentage of the risk of transmission of infection among technicians was (40.6%) [14]. This enhances and helps stimulate knowledge assessment and adherence to preventive procedures and management within laboratories.

Regarding wearing a work coat and protective equipment (PPE) in the dental laboratory: Only 40 (58.8%) of the technicians responded that they wear a work coat, 31 (45.6%) responded they wore gloves, 18 (26.5%) responded that

they wear a mouth mask, and only 3 (4.4%) wore protective eye shields. See Figure 3.

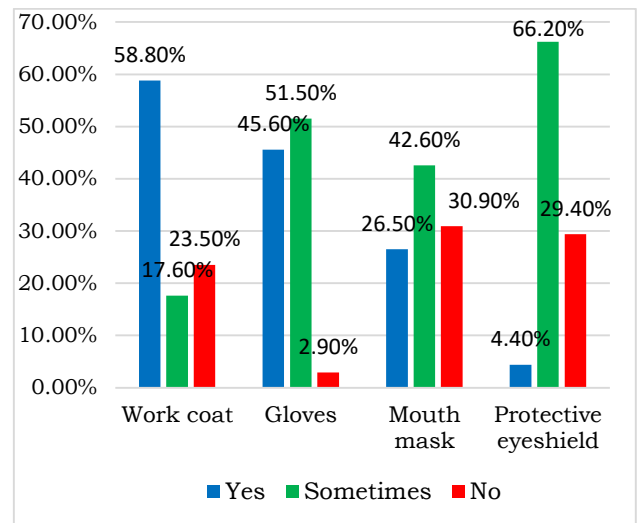


Figure 4: The rate at which dental technicians wear a coat and protective equipment (PPE) in lab.

The percentage of technicians wearing gloves in our study is lower compared to the study that took place in the United Kingdom and the United States, where it reached (90%) [15]. The percentage of technicians never wearing gloves in the laboratory was (2.9%) , compared to another study, which amounted to (39.5%) [16]. Another study reported that 84% of technicians used glasses and 59% sometimes used a mouth mask [17]. Personal protective equipment, such as a work coat, gloves, and face mask, is a must. Technicians must adhere to wearing them while working and, in the laboratory, to reduce the possibility of contamination and transmission of infections and diseases within the laboratory. The face mask also prevents inhalation of aerosols when working, which spread in very small sizes in the atmosphere. The use of personal equipment is very important in the dental laboratory in order to reduce the risk of transmission of infection.

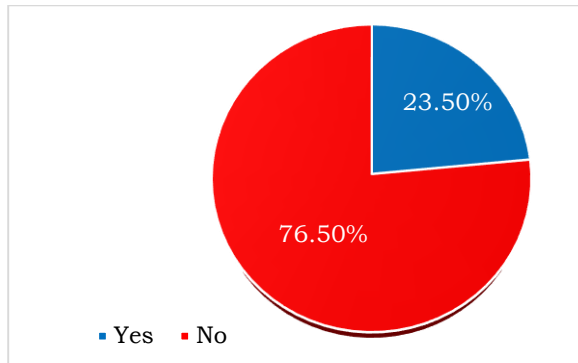


Figure 5: The vaccination against hepatitis B virus.

In our study, less than half of the technicians 16 (23.5%) received hepatitis B virus vaccination, which is lower than the study conducted in northern India [12]. All infection control studies also called for the necessity of receiving the vaccine against diseases that may be transmitted in the laboratory, especially hepatitis B [18].

This study found that a large percentage of dental technicians did not receive the vaccine against viral hepatitis. Therefore, awareness among technicians about the importance of receiving vaccination should be improved and enhanced in order to reduce the risk of infection and cross-contamination between patients and dental technicians as well as dentists.

Regarding the preventive measures from how to receive the dental impression until it is sent to the clinic; When we asked about the laboratory whether it has a separate reception area for impressions and other dental restorations sent from the clinic: 47 (69.10%) of the technicians responded that there is a separate reception area from the rest of the laboratory departments. Kaul et al., in their study, also confirmed that the use of separate areas within the dental laboratory is necessary [19].

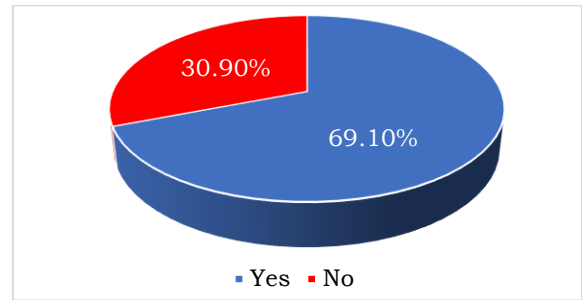


Figure 7: The presence of a separate reception area from the rest of the departments in the laboratory.

After investigative about the method of transferring the impression to the dental laboratory, some technicians, 28 (41.2%) responded that the impressions are transferred using a napkin and 22 (32.4%) is transported using a plastic bag.

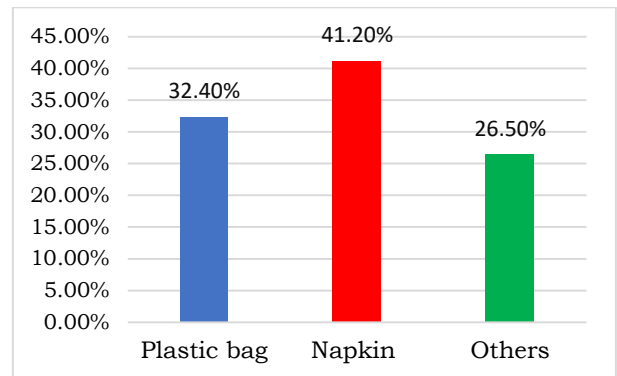


Figure 8: The method of transferring the impression to the dental manufacturing laboratory.

Concerning the methods used to disinfect dental impressions, 19 (27.9%) of technicians use the immersion method to disinfect impressions, while 49 (72.1%) answered the spraying method. It is recommended to use the immersion method rather than the spraying method to ensure that the disinfectant reaches all parts and surfaces of the dental impression. The researchers recommended disinfecting the impression either by immersion or spraying method [19,20]. **(Figure 9).**

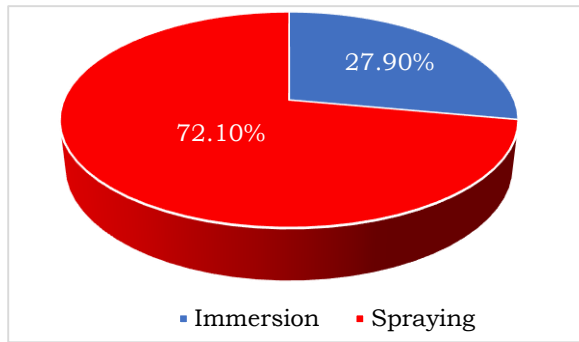


Figure 9: The percentage of use of dental impression disinfection methods.

As for wearing gloves when receiving impressions, dentures, and other replacements from the dental clinic. 58 (85.3%) of the technicians responded that they wear gloves, and only 10 (14.7%) of the technicians responded that they sometimes wear gloves when receiving the dental impression. About 54 (79.4%) of dental technicians change gloves after each case, **see Figure 10**. One of the necessary preventive measures is to wear single-use gloves, which must be changed after each case.

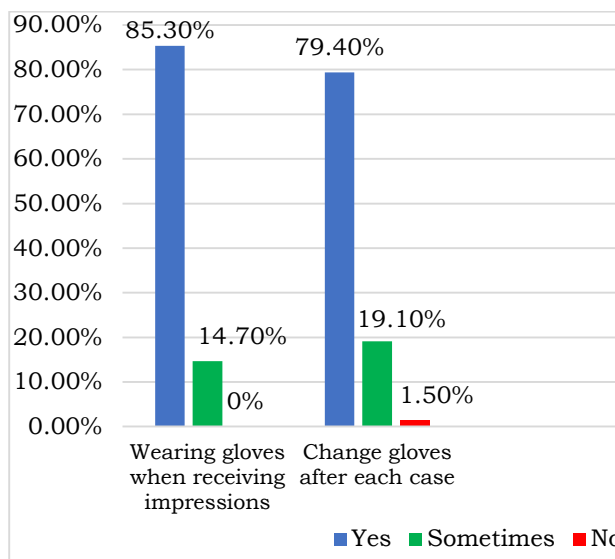


Figure 10: The percentage of technicians wearing gloves when receiving impressions and changing gloves after each case.

Only about 12 (17.6%) of the participants ensured that the dental impressions and dentures received from the clinic were disinfected. Therefore, the dental technician must maintain effective communication with

the dentist and ensure that the restorations and impressions have been disinfected to create a safe environment. About 62 (91.2%) of the technicians sterilize and disinfect impressions and compositions coming from the dental clinic,

Figure 11.

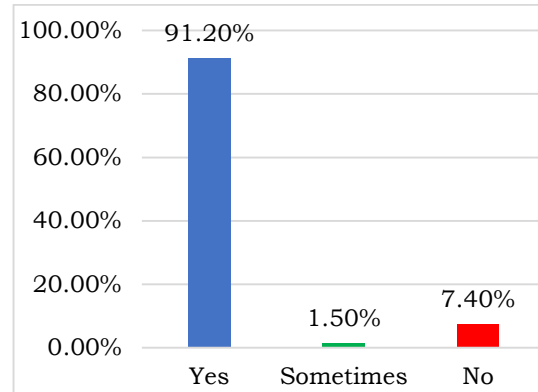


Figure 12: The rate sterilizes and disinfect impressions and compositions coming from the dental clinic.

As for disinfecting dental prosthetics and appliances before sending them to the dentist, 22 (32.4%) of the participants disinfect the restorations before sending them, and 11 (16.2%) of them sometimes disinfect them prior sending it to the clinic. Runnells said in his study [21]; that dental prosthetics must be rinsed well and carefully under water, cleaned of debris, and disinfected well before sending them to the clinic, and they must be placed in a properly sealed and sealed plastic bag.

Regarding sterilization procedures inside the laboratory, 34 (50%) of the dental technicians answered that the laboratory is sterilized on a daily routine after the end of work, **see Figure 13.**

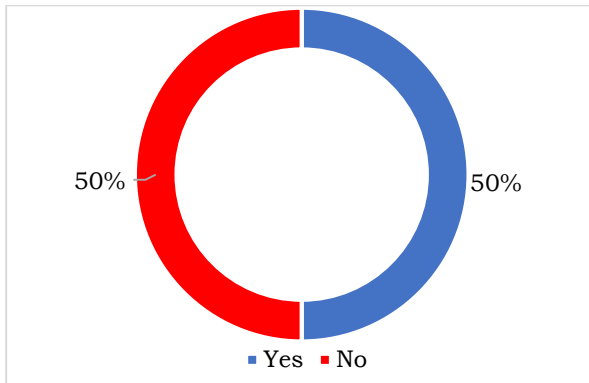


Figure 13: The rate of dental laboratory sterilized on a daily routine after the end of work.

All technicians included in the study 68 (100%) responded that they sterilize contaminated tools and equipment in the laboratory.

Regarding sterilizing or disinfecting the used pumice it periodically, 28 (41.2%) of the participants answered that they disinfect the pumice, and 28 (41.2%) of them also answered that it is disinfected sometimes and not at regular intervals, see Figure 14. Every day must be changed the pumice, and disinfect equipment and machines on a regular basis. to make the pumice solution, suspend the pumice in a tincture of green soap or another surfactant, then mix with a potent disinfection solution. [22].

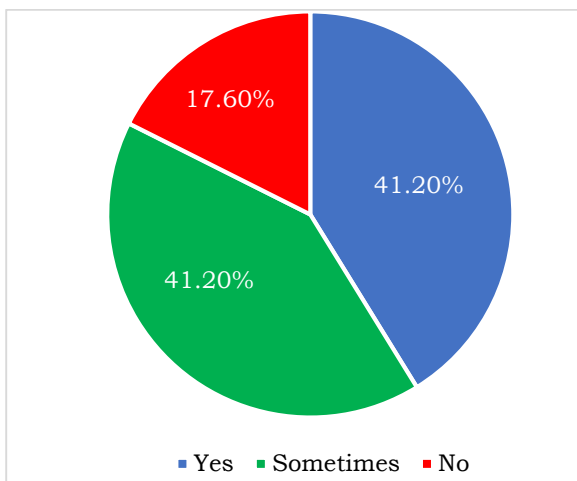


Figure 14: The rate of sterilizing or disinfecting the used pumice it periodically.

The study hypotheses:

- **The first hypothesis:** there is no complete commitment to wear a work coat and protective equipment in the dental laboratory.

It turns out that the arithmetic mean in the section on the working mouth mask is (2.05), which is an average, and the P-value for this section is (0.634), which is (>0.05), which is not significant. Therefore, we accept the small hypothesis that the wearing of the mouth mask and the paragraph of the coat and gloves is not applied. The level of significance, the P-value is (>0.05), and with this we accept the hypothesis. The alternative is that the respondents are applied to the eye shield, but in the area no, that is, it is not worn. As a general result of the hypothesis about the proper application of the procedures, the P-value= (0.000) was accepted.

See Table 2.

Alternative hypothesis: There is proper application of protective clothing and tools within the laboratory

	The phrase	Arithmetic mean	P-value
1.	Wear a work coat in dental laboratory.	1.65	0.001
2.	Wear gloves while working.	1.57	0.000
3.	Wear a mouth mask while working.	2.05	0.634
4.	Wear a protective eye shield while working.	2.25	0.000
The total		1.88	0.042

Table 2: Shows the statistical analysis of the results of the second hypothesis.

- **The second hypothesis** was accepted: dental technicians’ lack of interest in vaccination against hepatitis B virus.
- **The third hypothesis:** there is no transmission of infection through dental impressions, by applying the necessary procedures when receiving the impression from the clinic until it is sent.

It turns out that the arithmetic means in paragraphs (1 to 5) has an arithmetic mean in

the yes box, and the significance level P-value is (>0.05). Thus, the alternative hypothesis is accepted that the respondents are aware of infection control procedures. As a general result of the hypothesis that there is transmission of infection through dental impressions, the P-value, where its value was (0.000), accepts the alternative hypothesis that there is transmission of infection through dental impressions. **See table 3**

	The phrase	Arithmetic mean	P-value
1	Wear gloves when receiving impressions, dentures, etc. from the clinic.	1.15	0.000
2	Change gloves after each case.	1.22	0.000
3	Ensure that impressions and prosthodontic received from the clinic have been disinfected.	2.56	0.000
4	Disinfection of impressions and dentures that were not disinfected in the clinic.	1.16	0.000
5	Disinfection of prosthodontic before they are sent to the clinic.	1.76	0.000
The total		1.57	0.000

Table 3: Shows the statistical analysis of the results of the fourth hypothesis.

- **The fourth hypothesis:** There is no proper application of sterilization procedures within the dental laboratory.

It turns out that the arithmetic mean in items (103) is in the yes box, and the significance level P-value is (>0.05). Thus, the alternative hypothesis is accepted that the respondents apply sterilization procedures.

As a general result of the hypothesis that there is a sound application of sterilization procedures inside the laboratory, the P-value, where its value of (0.000) was (>0.05), accepts the alternative hypothesis. There is a sound application of education procedures within the laboratory. See table 4.

	The phrase	Arithmetic mean	P-value
1.	Sterilization of contaminated tools and equipment.	2.19	0.085
2.	Disinfect used pumice periodically.	1.59	0.000
3.	The laboratory is routinely sterilized daily after completing work.	1.74	0.028
The total		1.84	0.007

Table 4: Shows the statistical analysis of the results of the fifth hypothesis.

The second hypothesis: there are no statistically significant differences at the significance level (≥ 0.05) in the application sound for protective clothing and tools inside the laboratory in the study sample according to the work institution variable. **See table 5.**

Work institution	Numbers of technicians	Average	standard deviation	P value	Indication
Private	33	2.114	0.494	0.000	Statistical significance at 0.05
Governmental	35	1.657	0.349		

Table 5: Shows statistical analysis by work institution for the second hypotheses.

It shows that there is a difference in favor of public institutions and the statistical significance is (>0.05).

The fourth hypotheses: there are no statistically significant differences at the significance level (≤ 0.05) in the presence of transmission of infection through dental impressions in the study sample according to the Work institution variable. **See table 6.**

Work institution	Numbers of technicians	Average	standard deviation	P value	Indication
Private	33	1.612	0.299	0.283	No Statistical significance at 0.05
Governmental	35	1.531	0.314		

Table 6: Shows statistical analysis by work institution for the fourth hypotheses.

It turns out that there are no statistically significant differences at the significance level (≤ 0.05) in the presence of proper application of sterilization procedures within the laboratory in the study sample according to the work institution variable. It is not statistically significant where the P-value is (< 0.05).

4. Conclusion:

The study showed that dental technicians had varying levels of practices and attitudes regarding following infection control procedures, awareness of dental technicians regarding the various infection control measures that must be taken in the workplace are less than ideal, and this might increase the risk of transmission of infection in dental laboratory. There is also the possibility of transmission of infection through dental impressions inside dental laboratories, especially if the application of disinfection rules is neglected when dealing with them, from receiving them from the clinic until sending them again.

There is also a need to improve and enhance the awareness of technicians about the importance of receiving vaccination against hepatitis B. Therefore, there is a need to make more efforts to improve the follow-up and implementation of infection control measures and procedures within dental laboratories to ensure the safety and health of dental technicians and patients.

References:

1. Naz A, Hanif S, Kumar B, Musharraf H, Lone MA, Tariq A., (2020). Evaluation of Cross Infection Control Awareness and Practices in Dental Laboratories. *Pak Oral Dent J*; 40(2):98-102.
2. Balcos C, Barlean MC, Bobu L, et al., (2018). Evaluation of infection control knowledge and attitudes among dental technicians in Iasi. *Rom. J. Oral Rehabil*; 10.
3. Powell GL, Runnells RD, Saxon BA, et al., (2009). The presence and identification of

- organisms transmitted to dental laboratories. *J Prosthet Dent*; 64:235-37.
4. World Health Organization. [http://www.who.int/en/]. Geneva (Switzerland): The Organization; [updated 2006 Sept 21; cited 2006 Sept 21]. 2000. WHO Infection Control Guidelines for Transmissible Spongiform Encephalopathies. Report of a WHO Consultation, Geneva, Switzerland, 23-26 March 1999.
5. Inayati, E. Redjeki, S. Gofur, N., (2021). Prevention and Control of Cross Infection at Dental Laboratories in East Java Province of Indonesia., *Journal of Vocational Health Studies* p-ISSN: 2580-7161; e-ISSN: 2580-717x.
6. Kohn WG, Harte JA, Malvitz DM, Collins AS, Cleveland JL, Eklund KJ., (2004). Cover story guidelines for infection control in dental health care settings-2003. *J Amer Dent Ass*; 135(1):33-47.
7. Sofou A, Larser T, Fiehn NE, Owell B., (2002). Contamination level of alginate impressions arriving at a dental laboratory. *Clin Oral Investig*; 6(3):161-65.
8. Kugel G, Perry RD, Ferrar M, Lalicata P., (2000). Disinfection and communication practices: a survey of U.S. dental laboratories. *JADA*; 131(6):786-92.
9. Agostinho AM, Miyoshi PR, Gnoatto N, Paranhos Hde F, Figueiredo LC, Salvador SL., (2004). Cross contamination in the dental laboratory through the polishing procedure of complete dentures. *Braz Dent J*; 15(2):138-43.
10. Sande MA, Gadot F, Wenzel RP., (1975). Point source e pidemic of My coplasma pneumoniae infection in a prosthodontics laboratory. *Am Rev Respir Dis*; 112(2):213-17.
11. Sinha, D. K., Kumar, C., Gupta, A., Nayak, L., Subhash, S., and Kumari, R. (2020). Knowledge and practices about sterilization and disinfection. *Journal of family medicine and primary care*, 9(2), 793.
12. Gupta S, Rani S, Garg S., (2017). Infection control knowledge and practice: A cross-sectional survey on dental laboratories in dental institutes of North India. *J Indian Prosthodont Soc*; 17:348-54.
13. Al-Kheraif AA, Mobarak FA., (2008) Infection control practice in private dental laboratories in Riyadh. *Saudi Dent J*; 20:162-9.
14. Balcos C, Barlean M, Bobu L, Popescu E., (2018). Evaluation of Infection Control Knowledge and Attitudes among Dental Technicians in Iasi. *Romanian Journal of Oral Rehabilitation*.
15. Forna N, Cimpoesu N; Scutariu MM; et al, Study of the electro-corrosion resistance of titanium alloys used in implantology, Book Group Author(s): IEEE, Conference: 3rd International Conference on E-Health and Bioengineering (EHB) Location: Univ Med & Pharm, Iasi, ROMANIA Date: NOV 24-26, 2011.
16. Sofou A, Larser T, Fiehn NE, Owell B., (2002). Contamination level of alginate impressions arriving at a dental laboratory. *Clin Oral Investig* :6:161-5.

17. Solomon S., Ursarescu I., Martu,A., Luchian,I., Agop-Forna,D., Martu, S., Forna,N.C., Photo-activated toluidine blue o as adjunctive periodontal treatment, Revista de Chimie, Vol. 66, no., pg. 1166-1168.
18. Centers for Disease Control. Guidelines for Infection Control in Dental Health Care Settings-2003. MMWR 2003; 52(RR-17): 2003. 1-66. Available from: <http://www.cdc.gov/mmwr/PDF/rr/rr5217.pdf>. [Last accessed on 2017 Jul 19].
19. Kaul R, Purra AR, Farooq R, Khatteb SU, Ahmad F, Parvez PA., (2012). Infection control in dental laboratories - A review. Int J Clin Cases Investig; 4:19-32.
20. Ngpal A, Chaudhary V., (2010). Infection control in prosthodontics. Indian J Dent Sci; 2:5-10.
21. Runnells RR., (1988). An overview of infection control in dental practice. J Prosthet Dent; 59:625-9.
22. Headquarters Department of the Army., (1995). Disinfection and Sterilization of Dental Instruments and Materials. Washington, DC: Technical Bulletin. p. 1-12.